REMARKS

Reconsideration of presently solicited Claims 1, 2, 4 to 6, 9 to 14, 17 to 37, 39, 42 to 49, 51 to 63, and 79 to 84, respectfully is requested. Filed herewith is a Declaration Pursuant to 37 C.F.R. §1.132 of a recognized scientist in the field of atomic layer deposition, Dr. Markku Antero Leskelä. Also, filed herewith is a Petition for Extension of Time (three months) with the appropriate fee, and an Information Disclosure Statement.

Subject matter of original Claims 40 and 41 has been incorporated at Paragraph Nos. [0033] and [0038] of Applicants' Specification.

In an effort to expedite prosecution, Claims 16, 38, 40, 41, 50, and 70 to 78 have been canceled without prejudice. Claims 1, 2, 4 to 6, 9 to 14, 17, 19 to 22, 25, 28, 39, 45 to 49, and 57 are newly amended. Dependent Claims 79 to 84 are newly added. Claims 64, 65 and 69 are withdrawn as being directed to non-elected subject matter.

Newly presented dependent Claims 79 to 84 specify with greater particularity embodiments of Applicants' process involving additional process steps and embodiments wherein the chemicals (as defined) that are introduced into the reaction space are varied during the buildup of the carbon- and transition metal-containing thin film. This subject matter wherein different chemicals (as defined) are employed is discussed at Paragraph Nos. 33 to 35, 71 and 72 of Applicants' Specification as filed, in original Claims 38 to 41, and elsewhere.

Applicants have provided improved specifically defined technology for the reliable deposition of carbon- and transition metal-containing thin films. The concept of Applicants' specifically claimed contribution respectfully is urged to be lacking

following a thorough consideration of the reasonably derived teachings of the prior art. All statutory prerequisites for patentability are urged to have been met. Accordingly, for reasons indicated in detail hereafter the presently solicited claims are urged to be in condition for allowance.

As indicated above, Claims 74 to 78 that were rejected under 35 U.S.C. §112, first paragraph, through the use of the term "chemical genus" have been canceled in a sincere effort to expedite prosecution.

This leaves a sole remaining rejection under 35 U.S.C. §103(a). It respectfully is urged that the subject matter of Applicants' specifically claimed contribution of presently solicited Claims 1, 2, 4 to 6, 9 to 14, 17 to 37, 39, 42 to 49, 51 to 63, and 79 to 84 is not reasonably taught or suggested in the prior art and deserves recognition. The continued rejection of these claims over the different teachings of U.S. Patent No. 6,482,262 to Elers et al. alone or when taken with the similarly deficient teachings of U.S. Patent No. 5,933,760 to Iyer et al. or U.S. Patent No. 4,422,888 to Stutius, or U.S. Patent No. 4,378,987 to Miller et al. would be lacking sound technical and legal bases.

The following characterization of the Elers et al. teachings will not withstand technical evaluation particularly with respect to Applicants' presently solicited claims:

> It is noted that the reference fairly teaches the use of organometallic materials as an appropriate source compound (col. 5, line 7 – col. 6, line 67). Given such a teaching, one skilled in the art would reasonably expect that the deposition would be fully successful with the use of any of the materials listed including organometallic materials. It would have been obvious to utilize an organometallic compound with the expectation of obtaining successful deposition because Elers discloses that organometallic compounds can be used to achieve transition metal carbide films by atomic layer deposition.

It respectfully is submitted that patentability cannot be denied on the basis of a readily confirmable chemical misnomer. The following points serve to refute the above characterization of the teachings of Elers et al:

(1) Elers et al. never uses the word "organometallic."

(2) All of the carbon source materials identified by Elers et al. contain no metal as indicated:

(a) At Col. 2, lines 43 to 47 it is stated: "Exemplary carbon source compounds include boron compounds, silicon compounds and phosphorous compounds. Desirably, in these exemplary source gas compounds, either boron, silicon, or phosphorous bond directly to carbon." (underlining added)

(b) At Col. 5, lines 9 to 14 it is stated: "The carbon source material is preferably a boron source compound, a silicon source compound or a phosphorous source compound. However in an embodiment plasma is used and the preferred carbon material is a hydrocarbon." (underlining added)

(c) At Col. 5, line 25 to Col. 6, line 24, the contemplated "Boron Source Compounds," "Silicon Source Compounds," "Phosphorous Source Compounds," and "Hydrocarbons" are discussed in detail. (underlining added)

(d) Example 1 utilized "triethyl boron $(CH_3CH_2)_3B$."

(e) At Example 2 it is stated "the carbon source compound may be a boron, silicon or phosphorus carbon compound." (underlining added)

(f) At Col. 10, lines 20 to 23, it is stated: "The carbon source compound is selected from the group consisting of boron, silicon and phosphorus compounds that contain carbon. Alkyl borons, alkyl silicons and alkyl phosphorus compounds are more preferred." (underlining added)

(g) At Col. 11, lines 10 to 14, it is stated: "The carbon source chemical is selected from the group consisting of volatile boron, silicon, and phosphorus

> compounds that contain carbon. Alkyl borons, alkyl silicons and alkyl phosphorous compounds are more preferred." (underlining added)

In view of the above, the real teachings of Elers et al. with respect to "organometallic materials" are overstated in the Official Action. See Paragraph No. 6 of the Leskelä Declaration. In all instances, Applicants' presently solicited claims specify a different carbon source starting material which is a true "organometallic chemical" with the metal being aluminum, gallium, or transition metal.

The secondary references to Iyer et al., Stutius, and Miller et al. through the imprecise usage of the term "organometallic" in connection with different technology do not remedy the readily apparent deficiencies of the Elers et al. primary reference. These publications use the term "organometallic" in an incorrect chemical sense to refer to compounds of P, B, and Si. A chemist would recognize that P, B, and Si are not real metals, and clearly are not the metals specified in each of Applicants' presently solicited claims. See Paragraph No. 7 of the Leskelä Declaration.

Also, the technical and legal conclusions expressed in the Official Action would not withstand a detailed analysis with respect to Applicants' presently solicited claims.

It must be recognized that the underlying physical and chemical factors surrounding the satisfactory formation of thin films, such as by atomic layer deposition, is complex and requires empirical testing following a consideration of the recognized chemistry of the respective starting materials in order to be apprised of a successful outcome. See, for instance, Paragraph No. 5 of Leskelä Declaration.

Non-metals, such as B, Si, and P, are known by chemists to display different properties and reactivities than a true metal, such as aluminum, gallium, and

transition metals. See in this regard the Periodic Table of Elements, such as that which accompanies the Leskelä Declaration, where a dark line commonly appears so as to separate B, Si, and P from true metals, such as aluminum, gallium and transition metals. See Paragraph Nos. 8 and 10 of the Leskelä Declaration.

When true metals such as Al are compared to non-metals, such as B, Si and P, the true metals are found to display different physical and chemical properties, such as a lesser electronegativity and different oxidation states. Also, when bound to organic ligands the true metalorganic compounds are found to display less chemical stability and the participation of d-orbitals in bond formation. See Paragraph Nos. 9 and 11 of the Leskelä Declaration.

It respectfully is urged that no *prima facie* obviousness, particularly with respect to the subject matter of Applicants' presently solicited claims, is capable of being gleaned from a thorough and accurate reading of the reasonably derived teachings of the prior art. In order to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. This has not occurred. See, M.P.E.P. § 2143.3 citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered when judging the patentability of the claim against the prior art." *In re Wilson*, 424 F.2d 1342, 165 USPQ 494 (CCPA 1970).

Also, the mere allegation that the differences between the claimed subject matter and the prior art are obvious does not create a presumption of unpatentability. See *In re Soli*, 317 F.2d 941, 137 U.S.P.Q. 979 (CCPA 1963). Obviousness must be predicated on something more than it would be obvious "to try". See *Ex Parte Agrabright et al,* 162 U.S.P.Q. 703 (POBA 1967), and *In re Mercier*, 515 F.2d 1161,

185 U.S.P.Q. 774 (CCPA 1975). It is well-established law that patentability determinations of this type would be contrary to the statute. See *In re Antonie*, 559 F.2d 618, 195 U.S.P.Q. 6 (CCPA 1977); *In re Goodwin et al.*, 576 F.2d 375, 198 U.S.P.Q. 1 (CCPA 1978); and *In re Tomlinson et al*, 363 F.2d 928, 150 U.S.P.Q. 623 (CCPA 1966).

The limited and precisely different teachings of Elers et al., the inability for chemists to be impressed by the misuse of the term "organometallic" in the different technology of secondary references; the recognition by chemists that B, P and Si display different physical and chemical properties than Al, Ga, and transition metals; and the recognized overlying need for empirical research when developing new atomic layer deposition technology would render a continued rejection of the presently solicited claims contrary to the statutory mandate of 35 U.S.C. § 103. Accordingly, withdrawal of the rejection is urged to be in order and is respectfully requested.

If there is any remaining point that requires clarification prior to the allowance of the Application, the Examiner is urged to telephone the undersigned attorney so that the matter can be discussed and resolved at a personal interview.

Respectfully submitted,

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